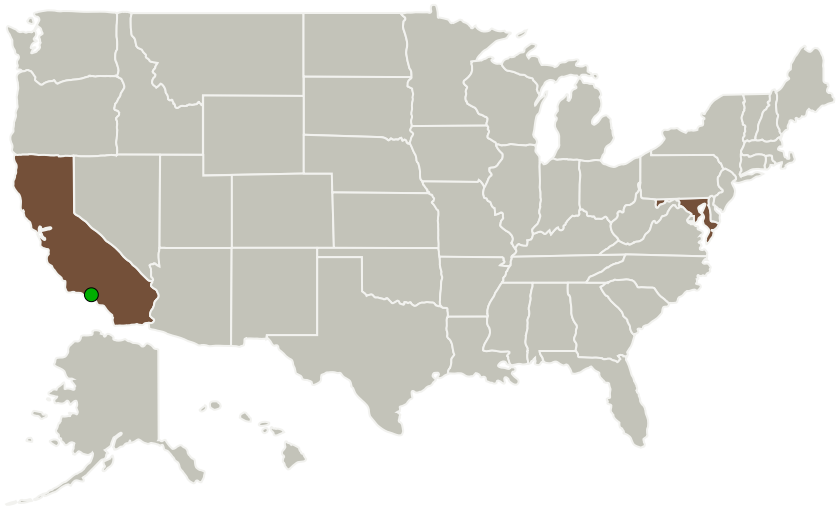
Fault Tree Generation and Augmentation, Phase I

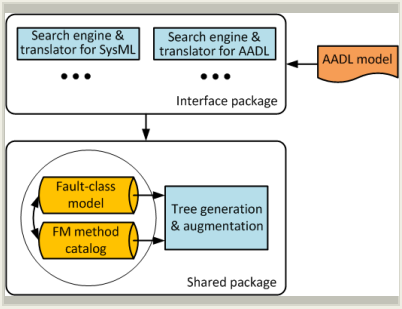
Completed Technology Project (2013 - 2013)

Project Introduction

Fault Management (FM) is one of the key components of system autonomy. In order to guarantee FM effectiveness and control the cost, tools are required to automate fault-tree generation and updates based on design models specified in standardized design languages such as AADL. Accordingly, we propose a fault tree generation and augmentation environment (FTGA). Equipped by a fault class model and an FM method catalog, FTGA evaluates not only failure behavior in the application under analysis but also FM's capability and adequacy for failure mitigation. Moreover, when an inadequacy in FM is revealed during fault tree generation or analysis, the fault tree will be allowed for augmentation through FM method insertion and be followed by a quantitative evaluation for FM effectiveness validation. Therefore, unlike traditional fault tree analysis which plays a passive role in FM, the automated FTGA environment actively and explicitly influence system design and updates, enabling "fault-tree-in-the-loop" for a system's life cycle. Further, by separating its generic functions (which we collectively call "shared package") from design-language-specific functions (which we collectively call "interface package"), FTGA will be an extensible modeling environment. The anticipated results from the Phase I project will be a preliminary prototype of FTGA and a demonstration for concept validation.

Primary U.S. Work Locations and Key Partners





Fault Tree Generation and Augmentation

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Fault Tree Generation and Augmentation, Phase I

Completed Technology Project (2013 - 2013)

Organizations Performing Work	Role	Type	Location
WW Technology Group	Lead Organization	Industry	Ellicott City, Maryland
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

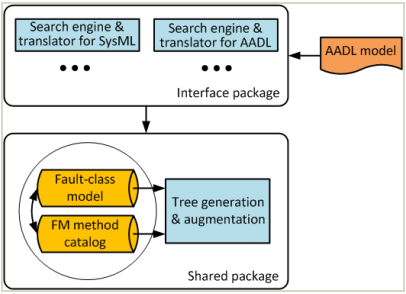
May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138158)*

Images



Project Image
Fault Tree Generation and Augmentation
(https://techport.nasa.gov/image/132941)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
WW Technology Group

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

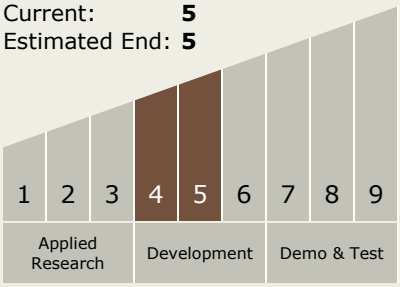
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Ann T Tai

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Fault Tree Generation and Augmentation, Phase I

Completed Technology Project (2013 - 2013)

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.2 Modeling
    - TX11.2.2 Integrated Hardware and Software Modeling

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System